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10 June 1981

East Europe Report

SCIENTIFIC AFFAIRS

No. 706

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CZECHOSLOVAKIA

USE OF CRYOGENICS IN ENGINE ASSEMBLY DESCRIBED

Prague STROJIRENSTVI in Czech Feb 81 pp 118-121

[Article by J. Roubinek and Eng P. Zbuzek, AVIA National Enterprise, Prague-Letnany: "The Use of Liquid Nitrogen To Achieve an Overlap Fit of Automotive Engine Parts"]

[Text] This article describes a process in which liquid nitrogen is used to achieve an overlap fit of parts in the assembly of automotive engines. The principle involved, the use of the thermal expansion of metals, is discussed, and the properties of liquid nitrogen and ways of storing it are described. Data are given for typical components which are chilled for press fitting.

Introduction

One of the methods of producing a permanent immovable joint is based on thermal expansion of metals in which heated or cooled components are press fitted.

This method assures strength and reliable transfer of load and is extensively used in installation work. In the case of certain parts to be joined (e.g., when the outer component has large dimensions), it is sometimes advantageous to decrease the dimensions of the inner part by cooling it far below freezing. This chilling can be effected with liquid air (-192° C), liquid oxygen (-183° C), liquid nitrogen (-196° C) or a mixture of solid CO_2 with alcohol or acetone when a temperature of -80° is sufficient. This article discusses the process in which liquid nitrogen is used to achieve an overlap fit of components of automotive engines.

Thermal Expansion of Metals

Thermal expansion is one of the most important physical properties of metals. It must be taken into account in all cases where the components operate at high or extremely low temperatures.

Starting from the well-known formula for calculating thermal expansion

$$\Delta l = l_0 \bar{\alpha}_1 (T_1 - T_0),$$

where $\Delta \ell$ is the thermal expansion in meters resulting from a change in temperature, ℓ_0 is the initial length in meters at temperature T_0, $\overline{\alpha}_1$ is the average thermal expansion coefficient for the material (K^{-1}), T_0 is the initial temperature (K), and T_1 is the final temperature (K), and substituting the approximate thermal expansion coefficient for the materials we use, namely $\overline{\alpha}_1 = 12.0 \cdot 10^{-6}$ K^{-1}, we find by a simple calculation that the contraction of a component 50 mm in diameter is about 0.1 mm, and that of a component 16 mm in diameter is about 0.04 mm, which are precisely the overlap values for these parts at normal temperature (Fig 1).

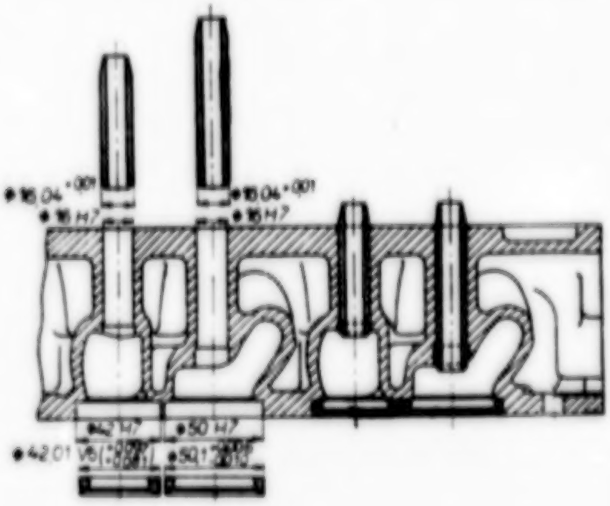

Fig 1. Cross section of cylinder head with guide bushings and valve seats before and after press fitting

It follows from the foregoing that because of thermal contraction, the fitting of parts which have been cooled to -196° C involves no difficulties.

Liquid Nitrogen

Liquid nitrogen is preferable to liquid air or liquid oxygen in cooling for safety reasons: when organic materials encounter oxygen or air they may catch fire or even explode. Liquid nitrogen does not have these properties and its chemical inertness, particularly under normal conditions, is well known.

Physical and Chemical Properties

Liquid nitrogen is a light, colorless liquid resembling water. To liquefy nitrogen it is necessary to bring it to the critical pressure of 3.29 MPa and critical temperature of -147° C. Under these conditions, nitrogen has its critical density, 311 kg/m^3. At temperatures in the vicinity of -200° C it has a density of 430 kg/m^3. Its boiling point at atmospheric pressure is -195.7° C. When cooled even further, nitrogen solidifies to a material resembling snow which has a melting point of -210° C. At room temperature it evaporates rapidly to a colorless, tasteless, odorless gas.

For laboratory purposes liquid nitrogen is stored in Dewar flasks.

Components and Materials Subjected to the Process

In producing the 702 engine for the AVIA A15 and A30 light trucks, the valve seats, valve guide bushings and idler gear pin are chilled before being fitted.

The components which are chilled are produced from materials whose specifications are given in the Czechoslovak State Standards [CSN] noted:

--intake valve seats	19 437
--exhaust valve seats	19 437
--intake valve guide bushing	42 2420
--exhaust valve guide bushing	42 2420
--idler gear pin	14 220

These components are press fitted into the cylinder head (material in accordance with CSN 42 2425) or engine block (material in accordance with CSN 42 2420). The tolerances are given in Fig 1.

The idler pin, with a diameter of 34s6, is inserted after chilling into an opening in the engine block with a diameter of 34H7.

Chilling Equipment

Dewar flasks holding 5 to 50 liters, biological containers holding 4 to 600 liters and horizontal containers holding 300 to 1,000 liters of liquid nitrogen are produced for tne transport and storage of liquid nitrogen and for chilling. They are produced by Ferox national enterprise, Decin.

For production use, the N 35 Dewar flask for chosen for transport and storage.

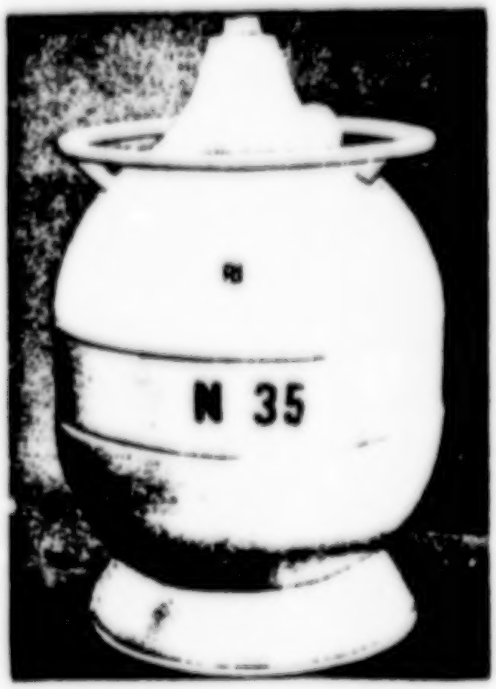

Fig 2. The N 35 Dewar flask

The Dewar flasks consist of two concentric aluminum vessels connected by a thin-walled neck of austenitic stainless steel. There is an insulating space between the inner and outer flasks, created by a layer of powdered vacuum insulation.

When liquid nitrogen is being transported in Dewar flasks they are frequently damaged or deformed by impact. For this reason, type L 500 and L 1000 horizontal containers were later used for transport and storage (Figs 3 and 4).

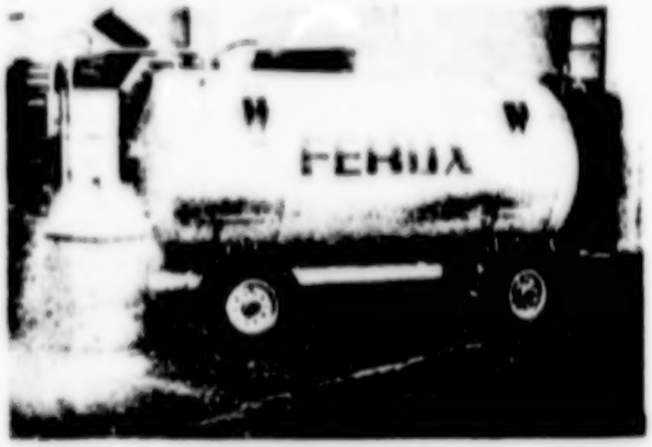

Fig 3. The L 1000 horizontal container being used to fill a BK 35 biological container with liquid nitrogen

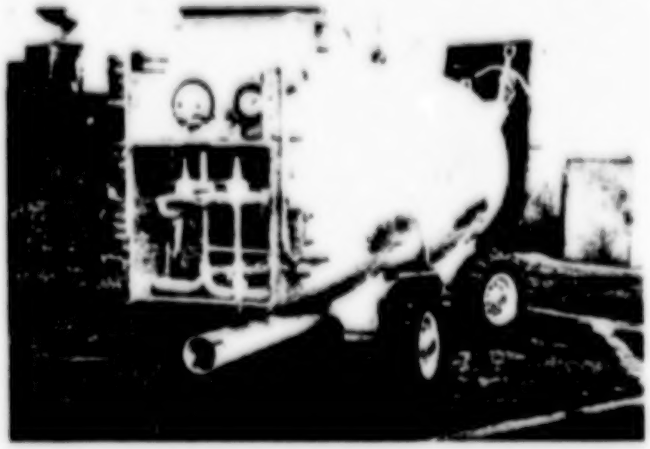

Fig 4. This view of the L 1000 horizontal container clearly shows its fittings and measuring equipment

The type L horizontal container is mounted on wheels and is easy to maneuver in the shop and when connecting it to a transport vehicle. The chilling is done in a BK 35 biological container, which initially was intended for transport and storage of various biological materials cooled to -196° C.

The design is similar to that of Dewar flasks, with the difference that the neck is much wider so that a suspended cylindrical holder measuring 70 mm in diameter and 300 mm high can be placed in the container. The holder has openings for the nitrogen to flow out and a plastic-coated suspending rod, and it is used to introduce the components to be chilled into the liquid nitrogen (Fig 5).

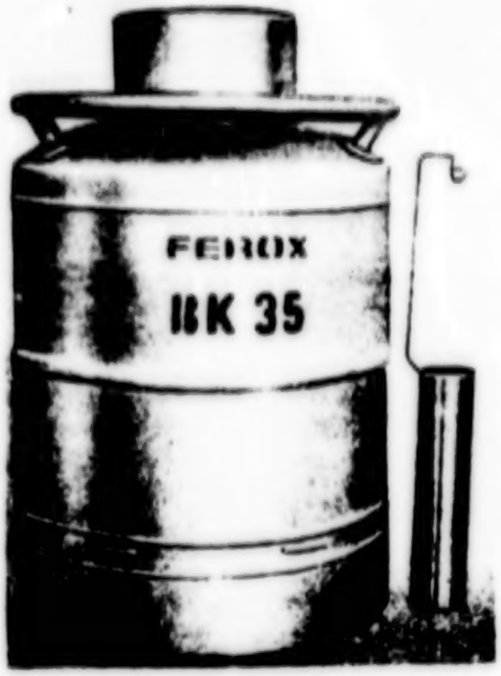

Fig 5. The BK 35 biological container with suspended cylindrical holder

Table 1. Technical Data for N 35 Dewar Flask

Volume (liters)	35
Evaporation (loss) of liquid N_2 (percent in 24 hours)	3
Weight of empty flask (kg)	18
Weight when filled with N_2 (kg)	46
Main dimensions:	
height (mm)	730
diameter (mm)	466
diameter of filling throat (mm)	19.6

With its filling neck stoppered, liquid nitrogen in the undisturbed flask will last for 4 weeks.

Table 2. Technical Data for the Horizontal Containers

	L 500	L 1000
Volume (liters)	500	1,000
Evaporation (loss) of liquid N_2 (percent in 24 hours)	1.7	1.2
Weight of empty container (kg)	400	730
Weight when filled with N_2 (kg)	810	1,520
Main dimensions:		
length (mm)	2,315	2,930
breadth (mm)	870	1,000
height (mm)	1,100	1,220

Table 3. Technical Data for BK 35

Volume (liters)	35
Evaporation (loss) of liquid N_2 (percent in 24 hours)	4
Weight of empty container (kg)	24
Weight when filled with N_2 (kg)	53.5
Main dimensions:	
height (mm)	715
diameter (mm)	456
diameter of filling throat (mm)	88

With the filling throat stoppered, liquid nitrogen in the undisturbed flask will last for about 25 to 28 days.

Chilling Procedure

Cleaned components of the proper dimensions are introduced, in the suspended cylindrical holders, into a BK 35 biological container full of liquid nitrogen (Fig 6).

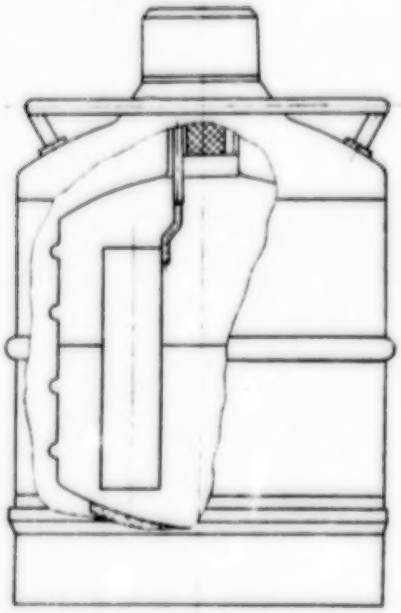

Fig 6. Partial view of biological container with suspended cylindrical holder half immersed in liquid nitrogen

The initial contact of the components with liquid nitrogen is accompanied by vigorous boiling and evaporation. The end of chilling is indicated by a gradual cessation of evaporation of nitrogen from the container. The duration of this operation depends on the size of the lot of metal items. In our case, 3 to 5 minutes are required for one cylinder head lot (4 exhaust valve seats, 4 intake valve seats and 4 + 4 guide bushings). The intensely chilled parts in the holder are taken out of the container and press fitted into the cylindrical head under a pressure of 7 MPa using a PYE 10N hydraulic press produced in East Germany by MWM. Suitable centering guides are used in this operation (Fig 7), and the openings in the head for the guide bushings are slightly lubricated with ball bearing oil. Centering guides are also used when introducing the chilled idler gear pin into the opening into the engine block with a hammer. Gradual warming by the air causes the part to expand and be securely joined to the cylinder head or engine block.

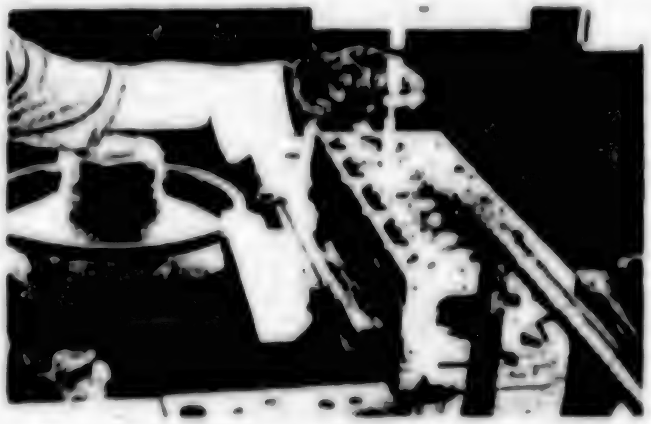

Fig 7. Fitting the guide bushing into the cylinder head using a centering guide. In the background is a BK 35 biological container, on whose neck are the hangers for the cylindrical holders. Frosting of the guide bushing surface is clearly visible.

Work Safety

In working with liquid nitrogen, it is necessary to avoid letting it come into contact with any part of the body on account of the intense cold.

Liquid nitrogen produces injuries similar to burns.

Workers handling liquid nitrogen, i.e., filling containers, replenishing them, chilling and the like, must:

--Wear loose gloves made of asbestos with an insert or of leather which can be rapidly drawn off the hands an which prevent the liquid nitrogen from seeping through;

--Wear a protective shield over the face or goggles whenever there is any danger that liquid nitrogen may be sprayed into the eyes;

--Wear boots sufficiently tight that liquid nitrogen cannot enter them;

--Wear rubber or plastic aprons extending below the tops of the boots.

When filling Dewar flasks with liquid nitrogen in transport containers, care must be taken to see that the flasks are not damaged or overturned. Liquid nitrogen may not be handled in small, poorly ventilated areas where a high nitrogen concentration in the air might result. The signs of oxygen deprivation are lassitude and dizziness. If they occur, the location must be left immediately and proper ventilation provided.

Procedures for Filling Flasks

When flasks which have not been cooled down are filled with liquid nitrogen, there is vigorous boiling and large amounts of gaseous nitrogen are given off. There is a serious danger of spraying of the liquid.

After each replenishment of a container with liquid nitrogen or after every operation in its interior, the neck must be stoppered. Similarly, the necks of the Dewar flasks are immediately stoppered to prevent evaporation losses. The use of defective stoppers may result in breakage of the container or Dewar flask as a result of internal overpressure. Ice forming on the stoppers must be removed. Considerable liquid nitrogen is lost during chilling and must be replenished. In intermittent work, all liquid nitrogen containers are always kept cooled, i.e., the liquid nitrogen is not completely pumped out, and quantities are promptly replenished. Cooling of containers which have warmed up results in excessive loss of time and of liquid nitrogen.

First Aid in Contact of the Surface of the Body With Liquid Nitrogen

If liquid nitrogen comes into contact with the skin or is sprayed into the eyes, the affected location must immediately be washed with a copious stream of cold water and an ice compress applied. If the skin is blistered or if the eyes are affected, the victim must immediately seek medical assistance.

Conclusion

The method of overlap fitting of parts by means of chilling with liquid nitrogen requires no imported raw materials or equipment and uses up no foreign exchange. The cooling medium and the facilities needed for transport, chilling and press fitting are widely available in this country. In addition to the Dewar flasks, biological containers and horizontal tanks for transport and storage of liquid nitrogen and for chilling which have been described, large upright tanks holding up to 20,000 liters are also produced. These tanks can be used for equipment which uses larger amounts of liquid nitrogen than that in our plant.

Liquid nitrogen is produced in this country by the Technoplyn national enterprise, Prague 9-Kije, and by SONP [United Steel Works National Enterprise] in Kladno-Drin, among others. It is available in several grades; ordering and distribution depend primarily on the quantity required by the consumer.

When introducing the process using liquid nitrogen, the following economic considerations must be taken into account: the price of the liquid nitrogen used is Kcs 3.82 per liter and the consumption in our enterprise for chilling the parts in question (weight 1.2 kg) for a single engine is 2.4 liters including all losses in storage and replenishment. The purchase price of a Dewar flask is Kcs 5,500, that of a BK 35 biological container is Kcs 13,500, and that of an L 1000 horizontal container is Kcs 121,000. These data can be used to compare in economic terms the two processes which are considered (heating and chilling).

As regards the design and production of larger automated equipment units for chilling (continuous operation with a liquid nitrogen tank in the line) we should mention that for these purposes it is advantageous to use special steel with 9 percent nickel and a low carbon content (CSN 17 501), which is tough at low temperatures. This steel is ideal for such design purposes, because it was developed and tested specifically for this use.

The process of chilling parts with liquid nitrogen which has been described has been rather thoroughly tested over a long period in our plant; good work results have been achieved with it and there have been no accidents or health problems. It cannot be replaced by thermal treatment of steel below the freezing point (-80 to -100° C) because in this case, in contrast to the process described, there are structural changes (austenite → martensite). Application of the method described presupposes both theoretical mastery of the plan and practical tests of its usefulness.

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8480
CSO: 2402/57

BRIEFS

CSSR'S INTERKOSMOS COOPERATION--Czechoslovakia has been developing navigational instrumentation for two Soviet Venera space probes which will study Halley's Comet on their way to Venus in 1986. Participating in this project will be, besides the USSR, also France, Hungary, Poland and Czechoslovakia. CSSR's Interkosmos experts have been receiving reconnaissance photography done by the crew of Salyut 6. However, photographing Czechoslovakia's territory is difficult since it can be successfully photographed for research purposes only 25 days per year. [Text] [Prague ZEMEDELSKE NOVINY in Czech 30 May 81 p 6]

CSSR-HOECHST COOPERATION ANNOUNCED--An agreement on S & T cooperation between the CSSR Ministry of Technological and Investment Development and the FRG chemical company Hoechst was signed 29 May in Prague. The agreement will make possible mutual exchange of information on agricultural chemicals, pharmaceuticals, plastics, organic dyes, paints, construction materials and parts, and ecology. [Prague LIDOVA DEMOKRACIE in Czech 30 May 81 p 4]

NEW INTERKOSMOS FACILITY--A new building for the Astronomical Institute, Slovak Academy of Sciences, is under construction in the Stara Lesna meadows area near Tatranska Lomnica. Of the three observation buildings located in the new complex one will contain a twin telescope for observation of sun's photosphere and chromosphere. Another building will house a telemetry reception center for signals from Interkosmos satellites. [Bratislava PRACA in Slovak 26 May 81 p 6]

CSO: 2402/63

HUNGARY

SUCCESSFUL APPROBATION OF NEW HUNGARIAN MODEM, THE AM-12 TD

Budapest SZAMITASTECHNIKA in Hungarian No 2, Feb 81 p 6

/Article by Lajos Nobik: "A New Hungarian Modem Being Manufactured; ESZR Approval Successful"/

/Text/ International ESZR /Uniform Computer Technology System/ testing and approval of the Orion AM-12 TD model 2x1200 bit-per-second, full duplex data transmission modem took place in Budapest between 8 and 17 December 1980. This new modem, with code number ES 8007 (described in SZAMITASTECHNIKA No 2, 1979), was born simultaneously with the development of CCITT recommendation V 22; contributions offered on the basis of developmental results were the first instance of bringing Hungary closer to the data transmission standardization work of the CCITT.

General Operation

The AM-12 TD modem meets in full the CCITT V 22 recommendation finalized in 1980 for a "1,200 bit per second duplex modem standardized for open connected telephone network and leased circuits" and it meets the ESZR technical requirements pertaining to the Modem 12 equipment, code number ES 8007. With a frequency division of the speech channel the AM-12 TD modem provides simultaneous transmission of data signals in two directions (full duplex). The transmission of data signals on the two channels thus obtained (lower and upper band) takes place with differential phase state modulation with synchronous line signal transmission at a speed of 600 bauds. The transmission of the sequential binary data signals of the data source at a speed of 1,200 bits per second at a modulation speed of 600 bauds is realized with dibit generation, and four different phase state changes correspond to the four dibit combinations possible. Prior to dibit generation the modulating data signals go into a scrambler, as a result of which the spectrum of the modulated line signals is of even density independent of the content of the data signals to be transmitted.

Dibit values 1,200 bit/s	Bit values 600 bit/s	Phase charge
00	0	plus 90 degrees
01	--	0 degrees
11	1	plus 270 degrees
10	--	plus 180 degrees

Amplitude or phase distortions of the modulated line signals which take place in the transmission channel are counterbalanced by the execution of evening-out tasks included in the characteristics of the transmitter or receiver filter. In order to even out amplitude distortion in the local section it is possible to interpolate a separate amplitude corrector in the transmitter part of the modem. The received dibits are restored by coherent demodulation of the modulated line signals received. By decoding we get from the dibits the received signal sequence, from which the descrambler produces the received data signals for the data receiver. The construction of the modem also makes possible the transmission of sequntial binary data signals at a speed of 600 bits per second, with an unchanged modulation speed of 600 baud. In this case one each modulation phase state change corresponds to the modulating binary 0 and 1 state.

The synchronous modulation system of the modem provides directly only for transmission of isochronal data signals at a speed of 1,200 (600) bits per second, in accordance with version "A" of the CCITT V 22 recommendation. In order to transmit start-stop data at a speed of 1,200 (600) bits per second in accordance with version "B" of the V 22 recommendation the AM-12 TD can contain a special start-stop/synchronous transformer unit.

The control circuits of the model provide manual or automatic setting up of the data link and the creation of data, speech and test operational modes.

Construction of the Modem

The modem is placed in a table model, stationary box. The LED indicators and switches on the front panel provide, on the one hand, an overview of the monetary operational state of the modem and, on the other hand, ensure the quick selection of the desired operational modes (SPEECH, DATA AND TEST). The circuits are built up on a double ESER printed circuit card 150x300 millimeters in size, with the exception of the power unit and a few minor units (for example, line mountings and interface adapters). The modular--plug-in--construction is advantageous in regard to both manufacture and service. An interesting aspect of the circuit solution is that by using LS TTL integrated circuits in addition to the normal TTL integrated circuit construction the modem can be manufactured in such a way that it uses less power.

Applications Advantages of the AM-12 TD

The AM-12 TD quadruples the maximum 300 bits per second speed of existing duplex modems (ES 8002 or CCITT V 21) without changing the line transmission procedure. Thus such links on a two-wire connected network can be modernized simply by changing modems. Heretofore FSK modems (ES 8006 or CCITT V 23) were used for full duplex transmission at speeds of 1,200 bits per second on four-wire (leased) direct links. The AM-12 TD modem now provides the same transmission at a cheaper line cost via two-wire connected or direct links

The ES 8006 or CCITT V 23 modems (for example, the Orion AM-1200) make possible only semi-duplex transmission at speeds of 1,200 bits per second on a connected network, which creates a delay in transmission of about 300 ms per block due to direction changes. There is no direction change delay with the full duplex AM-12 TD modem. Full duplex transmission is a fundamental characteristic of current modern data link control procedures (HDLC, SDLC, BDLC, etc.). Full duplex transmission is especially advantageous in interactive data transmission applications,where the more efficient, swifter operation (for example with picture screen data stations) compared to semi-duplex transmission can be sensed directly. In the case of the AM-12 TD modem the bit-sequence-independent transmission property of traditional synchronous data transmission modems is expanded by direct transmission of the information messages consisting of start-stop characters. Thus the very widespread end-of-data equipment with a speed of 1,200 (600) bauds can be connected directly to the synchronous signal processing system of the modem. Since a speed of 1,200 bits per second is entirely satisfactory for most existing end equipment this service of the modem makes possible very general applications.

The modern diagnostic capabilities characteristic of the AM-12 TD modem include automatic guidance into a loop of the remote modem, a new test solution which was first standardized in the V 22 recommendation in the series of CCITT modem recommendations.

Full duplex transmission of data at a speed of 1,200 bits per second with the AM-12 TD modem is a modern systems technology solution which offers services appropriate to modern needs on existing telecommunications channels. This statement is true despite the modern services of the new data networks being introduced (the new electronic telex and data transmission network of the Hungarian Post Office) because traditional telephone line data transmission will remain a significant factor until the end of the century, not only in Hungary but around the world--because of the much greater extent of the telephone network, because of users who also need speech transmission, and, perhaps, because of fees.

The Result of International Testing and Approval

An international committee consisting of Bulgarian, Czechoslovak, Hungarian, Romanian and Soviet experts established that the technical characteristics of the AM-12 TD modem meet the technical requirements of the equipment and the ESZR standards and make possible the use of the modem in TAF /remote data processing/ systems. The technical subcommittee conveyed special recognition to the developers in that they succeeded in creating a modem at a high level meeting the CCITT V 22 recommendation within one year of its preliminary approval in 1979. Zero series manufacture of the equipment began following the successful international test and approval and this will be followed immediately by series manufacture also. A long-time test of one month done in 1980 on the national postal network (in a Budapest-Szeged-Kiskunhalas-Cegled-Budapest loop) provided very favorable measurement results. We got similarly good results on the occasion of control measurements done on the Budapest connected telephone network on links established between Budapest and Miskolc, between Budapest and Gyor and between Budapest and Sopron. Thus we are hoping that users will soon confirm the opinion of the international committee.

8984
CSO: 2502/69

HUNGARY

TECHNICAL SERVICING OF ES REMOTE DATA PROCESSING SYSTEMS

Budapest SZAMITASTECHNIKA in Hungarian No 2, Feb 81 p 4

[Interview with Gyula Suranyi, deputy director of the NOTO OSZV, by Dr Ivan Szabo: "Technical Servicing of ES Remote Data Processing Systems"]

[Text] The use of computer technology is a basic tool for increasing the efficiency of producing and guidance work. The present situation of our people's economy demands that the question of efficiency come to the fore more than in the past in the period of the Sixth Five-Year Plan in the area of computer technology also.

On the one hand computer technology must aid more than heretofore an improvement in the efficiency of production and, on the other hand, it is also necessary to increase the efficiency of computer technology work in order to attain this goal; remote data processing is one of the most important forms for the realization of this. In connection with these themes we asked Gyula Suranyi, deputy director of the NOTO OSZV [National Computer Technology Enterprise], to answer a few of our questions and thus provide our readers with timely information.

[Question] What decisions of the KSH [Central Statistics Office] and the OMFB [National Technical Development Committee] provide the background for the fact that the NOTO OSZV has begun preparations to provide the complex technical servicing activity needed for the domestic spread of TAF [remote data processing] systems? Have measures been taken in the interest of realization? What material background have they provided?

[Answer] In the course of the domestic application of computer technology we have reached a level of technical development where it is impossible to meet the new user demands arising and to realize efficient utilization of technical tools without remote data processing. In the past period the National Technical Development Committee dealt with the problems of a domestic spread of remote data processing and on the basis of the stand taken the NOTO OSZV received from the KSH a commission to carry out the tasks connected with the creation and complex technical servicing of TAF systems based on imported ES [Uniform Computer Technology Systems] machines. On the basis of this the enterprise began preparations for TAF tasks. We dealt first with professional preparation, in the framework of internal study courses, further training, etc., and parallel with this we created a work group to prepare a strategy for enterprise TAF activity. With the ending of the preparatory phase we defined the organizational and substantive conditions for the TAF undertaking. In addition to enterprise resources we relied on the support of the KSH and the OMFB to assure the substantive conditions.

[Question] What is the task of the NOTO OSZV in the domestic spread of remote data processing systems?

[Answer] Our tasks in connection with TAF systems are closely connected to the complex technical servicing of ES and, begun in the recent past, MS [Uniform Mini-Computer Technology] systems which has constituted our activity thus far. As is well known, our activity is based on the fact that we take over from the manufacturing enterprises those obligations which are connected with installing, guaranteeing and servicing equipment. In the case of TAF systems the commercial tasks and the already mentioned technical tasks are supplemented by the integration of components from various manufacturers into a unified system. Naturally we want to include in this activity, which involves very complex professional and technical questions, the professional associated institutions, manufacturing enterprises, etc. because without them this task could not be carried out.

[Question] What is your opinion about the ES TAF systems operating in Hungary? We are thinking here, for example, of the systems of the KFKI [Central Physics Research Institute], the VEIKI [Electric Power Industry Research Institute] and the BME [Budapest Technical University].

Can these achievements be used as model systems, or rather what can be used from these achievements in developing additional domestic (model) systems?

[Answer] Unfortunately the TAF systems connected to imported ES computers which have been created in our homeland thus far came into being, in general, as a result of unique developments. So the results achieved there can be used to only a very limited hardware or software component (for example, the KFKI system to a TPA 70). Naturally the creation of these represented pioneering work under domestic conditions and in the course of these activities the institutes acquired indispensable professional experience. At the BME and TELE JS subsystem is linked to an ES 1032 computer so very useful experience can be acquired with the subsystem there. But applications tied to computers of the second ES series (ES 1055 and ES 1035) will require additional developmental activity.

[Question] Is there coordination between the Telephone Factory, manufacturing multiplexors and modems, Videoton, manufacturing terminals, and the NOTO OSZV, delivering and setting up the ES/MS systems? Has there been coordination in the development of domestic TAF systems? I am thinking here primarily of the developments taking place at Videoton.

To what extent does the NOTO OSZV follow these activities?

[Answer] In order to provide the broad coordinating activity--affecting a number of ministries--necessary in the area of remote data processing we created, on the basis of an OMFB proposal, the Remote Data Processing Temporary Work Group (TAF IMCS), which is a coordinating and decision preparing organ of the Computer Technology Inter-Ministry Committee. In accordance with principles adopted by the TAF IMCS the OSZV is striving to further strengthen and make more profound the commercial and professional contacts with domestic institutions and enterprises manufacturing TAF elements, thus, naturally, with Videoton and the Telephone Factory also. We should know the domestic developmental achievements and we are trying to see that these are more widely used linked to the ES and MS equipment sold by us.

/Question7 What is the purpose of the "association trading in TAF subsystems" created by the Telephone Factory and the NOTO OSZV?

/Answer7 The "association trading in TAF subsystems" founded jointly with the Telephone Factory also aids in carrying out our coordination tasks. Its purpose is to determine requirements on the basis of user needs, or to create and propagate TAF subsystems based on domestic tools.

/Question7 What variety of terminals is available to domestic users?

/Answer7 In connection with the variety of terminals which can be acquired on the socialist market we can call the selection of conversational mode equipment satisfactory but the terminals needed for batched remote data processing exist only in an experimental state. The terminals using mechanical units manufactured earlier (typewriters, punch tape input and output units) are already obsolete and it is not desirable to use them in new systems. In regard to the prospects, the variety of conversational display terminals is satisfactory, but if we take into consideration the ability to deliver and the delivery times the situation is far from ideal. In regard to display terminals suitable for the most modern, local data processing, pre-editing, etc. the domestic manufacturers are generally not interested in domestic sales, because of the high ratio of parts and sub-assemblies of capitalist origin, and the development of some terminals is substantially delayed in comparison to what had been planned. It would help a solution of the problem if the enterprises producing domestic terminals would make greater efforts to satisfy domestic needs.

/Question7 Does the NOTO OSZV have the professional background (personnel, background machines, high level knowledge, etc.) needed to carry out a complete TAF task? How and when will this activity be supported by the ES 1055 system of the NOTO OSZV, the installation and activation of which began in the new headquarters in November 1980?

/Answer7 In my opinion the professional experience of the OSZV thus far makes the enterprise capable of carrying out even this complex task. As I have said already in regard to concrete resources we are counting to an increased extent on the effective cooperation of associated institutions, primarily the SZAMKI /Computer Technology Research Institute7, primarily in the solution of software problems. The ES 1055 computer placed into operation in the recent past is one of the largest capacity types of the present ES series and has special significance from the viewpoint of remote data processing. We want to attach a TELE JS remote data processing subsystem of Polish manufacture to this machine. Colleagues from the GDR and Poland will help us in this work; the subsystem is expected to go into operation in the first half of 1981.

/Question7 When will the NOTO OSZV undertake to place into operation complete ES/MS TAF systems?

/Answer7 the OSZV will begin selling complete TAF subsystems this year. We are basing our acquisitions primarily on two sources. We are offering the first TAF subsystems to be set up by us, on the one hand, with a TERTA ES 8410 multiplexor of domestic manufacture and, on the other hand, with the already mentioned Polish TELE JS (ES 8371.01) TAF processor. According to the TERTA promise in the case of TAF subsystems based on domestic devices the manufacturing capacity for the multiplexors is assured; the BSC algorithm to service the synchronous terminals will be available in the first quarter of 1981; but there is not yet a delivery capability for the number of modern display terminals needed for the systems. We have a basic contract with the Polish partners for delivery of five of the TELE JS subsystems, which include display terminals, in 1981. Use of MS computers in an ES remote data processing system is a very important question, the significance of which is recognized by our Soviet delivery partner also; the necessary hardware-software activity figures in the appropriate international work plans and we can expect the first solutions in the near future.

/Question/ Does the NOTO OSZV have market research information on the basis of which one could say which enterprises are ready or will be ready in the Sixth Five-Year Plan period to operate TAF systems? What is the breakdown of those which will be operating (RJE, CRJE, TSO /expansion unknown/)?

/Answer/ Earlier our enterprise, with the help of the National Market Research Institute, did a broad survey of TAF needs in the Sixth Five-Year Plan. As a result of this survey it can be stated that a significant proportion of the institutions intending to use computer technology in the future will need a TAF subsystem also. In regard to the breakdown of those which will be operating it can be expected that the significance of interactive solutions will increase greatly.

/Question/ How does coordination between the user, the deliverer of the large computer and the NOTO OSZV take place in setting up a TAF systems? What sort of unifying attitudes guide the activity of the NOTO OSZV in this? How are these aspirations realized? With what methods are the configuration and the size of the central storage determined? What controlling or plan calculations are done by specialists after user requirements are submitted to determine the needs?

/Answer/ Coordination of the development of a TAF system between the deliverer of the large computer and the user is the task of the OSZV. Since in the case of TAF systems the deliverer of the large computer and the deliverer of the TAF subsystem (system elements) can generally be found in different institutions, indeed in different member countries of the ES system, special emphasis is given to the coordinating activity and there are higher professional on the coordinating institution. We determine the configuration of the first systems jointly with the professional staff of the manufacturers; this is all the more justified since the solutions are frequently new ones, and not only for Hungary (for example, the ES 1055 TELE JS joint system).

/Question/ What are the ES TAF software tools which the NOTO OSZV makes available to the user together with the computer; what sort of deficiencies might hold back certain applications?

/Answer/ Our aspiration is to develop model systems at the applications level which can be widely used and which ensure the applicability of modern software products (for example, IDMS) acquired from central sources for nationwide use and this is in harmony with the goals of the OMFB.

/Question/ What motivated the NOTO OSZV to set up its own system with the TELE JS subsystem based on the ES 8371-01? What are the services which led to this decision instead of, for example, use of the TMX 2410 multiplexor from the Telephone Factory?

/Answer/ The OSZV wants to establish a TAF model system consisting of two partial systems. In the course of realizing the model system the OSZV, as chief contractor for the ES TAF systems, could acquire experience in the areas of installing, operating and providing software to domestic and import TAF tools. In accordance with the needs and possibilities of various users the model system provides domestic users with a reference in regard to use of both domestic (ES 8410) and the most developed imported ES TAF tools (ES 8371.01). So we developed models of TAF applications which can be adapted to the capacity of ES computers of various size and which can be used in a broad sphere. The TAF system to be established makes it possible for the OSZV to modernize its services, making it possible to expand background machine service with the aid of terminals located with the customers.

8984
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MAGNETIC BUBBLE MEMORY, ITS TECHNOLOGY

Budapest SZAMITASTECHNIKA in Hungarian No 2, Feb 81 p 2

/Article by Andras Ribenyi: "The Magnetic Bubble Memory and its Technology"/

/Excerpt/ The technology of the magnetic bubble memory begins with the production of the primary material. For the magnetic layer we use an artificial version of garnet crystal, a semiprecious stone occurring in nature also. Since it would be unmanageably fragile in a thickness of a thousandth of a millimeter we must first prepare a substrate with mechanical strength. To do this we grow a crystal with a diameter of about 6 centimeters, weighing several kilograms, out of a melt of a non-magnetic garnet at a temperature of nearly 2,000 degrees Celsius. In the course of this process (the initial material can be, among other things, gallium, obtained as a by-product of domestic aluminum) we must produce a crystallographic order of virtually "mathematical" perfection because the future floating bubble island can hang up in a material blemish however small and its storage function is lost. We cut the finished crystal into slices about half a millimeter thick and polish the surface of these to atomic fineness. We carry out this operation in an especially clean space to avoid scratches caused by particles of dust. The magnetic primary material of the bubble memory is grown on the substrate thus obtained, in which we must ensure a precise balance of the seven types of material making up the crystal in the course of a process taking place at a temperature of about 1,000 degrees Celsius so that the magnetic properties will be suitable. The highly automated growing equipment which works under dust-free conditions was developed in the KFKI /Central Physics Research Institute/. In the interest of increasing the reliability of the future storage we bombard the surface of the magnetic garnet layer with high speed rare gas ions. This is done with devices and methods created on the basis of experience acquired in the course of nuclear physics research by the KFKI. Naturally, we study the properties of the finished storage primary material with methods which are also used in basic research.

The mobility, a property which advantageously distinguishes the bubbles from magnetic tape carrying a sequence of poles bound in place, is accompanied by the danger of mixing the information preserved in storage. The location of every single information element in the bubble memory must be designated in advance with a magnetic formation favorable to the bubble. There are 32,000 such formation in the first, now completed, version of our storage technology and there will be more than 80,000 or even 300,000 such formations in the more developed versions being prepared--in an area hardly larger than the nail of the little finger. We designed the model, largely by mechanical means, with computer technology tools developed by computer experts of the research center. In the actual bubble memory the model is prepared in a manner similar to a photographic procedure. The "negative" needed for this is an achievement of semiconductor researchers of which they can be justly proud (at the Signal Technology Industrial Research Institute, HIKI). In the course of realizing the bubble memory we routinely prepared models thinner than 2 thousandths of a millimeter.

A capsula containing the electromagnetic micro-environment of the magnetic storage (memory), magnets, coils and fine wires creates a link between the magnetic world of the bubble memory and the electric world of the computer. The actual storage element is built into this. In the course of development we relied primarily on the magnetic research of the KFKI, which can look back on decades of tradition, but we also used the experiences of the semiconductor industry and its research (EIVRT /United Incandescent Lamp and Electrical Company/, BME /Budapest Technical University/ and HIKI).

The operating ability of the device, produced at the end of a number of technological steps, must be analyzed carefully. This requires measuring techniques controlled by a computer; experts of the KFKI developed a version of this adapted to the task.

We regard the domestic creation of a technology for bubble memory as the most important achievement of 5 years of research and development work done with the cooperation of colleagues from the Hungarian Optical Works with researchers of the KFKI. The technical data of the bubble memory unit created as the first result of the application of the technology are as follows: full capacity 33,264 bits; useful capacity 30,240 bits; word length a maximum of 80 bits; information speed 50 kbits per second; bubble size 5 microns; size of storage chip 5x5 mm^2; and finest element 2 microns.

8984
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HUNGARY

PHARMACEUTICAL RESEARCH NETWORK, PROJECTS OUTLINED

Budapest MAGYAR KEMIKUSOK LAPJA in Hungarian No 2, Feb 81 pp   -64

[Article by Gyula Horvath, Hungarian Pharmaceutical Association]

[Excerpt] Our Current Research Network

Research within the pharmaceutical industry presently takes place in six enterprise research facilities and two industrial research institutions under the NIM [Ministry of Heavy Industry]. The table below illustrates the number of employees engaged in research and development during the last 20 years:

Designation	1960	1965	1970	1975	1979
Total researchers	902	1267	2203	2527	2677
Researchers proper, included in the above	250	321	590	871	946
Total research staff, as percent of total industry staff	8.2	8.9	11.5	12.7	12.9

The table below illustrates the total research expenditure:

Designation	1960	1965	1970	1975	1979
R/D expenditure, total, in million forints	68.2	155	314.9	602.7	975.1
As percent of the price income of the industry sector	5.4	4.4	4.67	4.64	5.02

In addition to its own research sections, the pharmaceutical industry also uses 120-130 academic research institutions, university institutes, industrial research institutes, clinics, and hospitals through research contracts. The Clinical Pharmacological Network, of which 26 local branches operate in clinics and hospitals under central scientific supervision and which was established in 1967, is a particularly useful facility for Hungarian pharmaceutical research. In addition to the research institutions mentioned above, another 30-40 clinical and hospital units participate in pharmaceutical research by carrying out studies under the assignment from the Scientific Hygiene Council's appropriate committee and the National Pharmacy Institute on the clinical effects of new pharmaceuticals. This is of decisive importance in connection with the registration of the pharmaceuticals concerned.

The Council of Ministers approved the National Long-Range Scientific Research Plan in 1972. Within the framework of this plan, studies on biologically active materials has been emphasized and placed under the jurisdiction of the minister of heavy industry. Basic pharmaceutical research projects are also part of this featured study. A total of 89 research institutions operating under the jurisdiction of five high-level government bureaus (MTA [Hungarian Academy of Sciences], NIM [Ministry of Heavy Industry], OM [Ministry of Education], EuM [Ministry of Health], and MEM [Ministry of Agriculture and Food]) participate in the project. The work is carried out under the coordination of a body made up of designees from the above bureaus and the leaders of the OMFB [National Technical Development Committee], chaired by the representative of the NIM. The Program Bureau of the Hungarian Pharmaceutical Industry Association administers the implementation of the resulutions of the body and handles the details of the coordination.

Each year the Program Bureau has held 4-5 subject colloquia, at which the state of a major theme complex was described and where the cooperation of the research institutions involved has been determined. Coordination of the following themes within the main project is in progress:

- Pharmaceuticals for diseases of the heart and the circulatory system;
- Pharmaceuticals affecting the central nervous system;
- Anti-inflammation agents;
- Anti-tumor drugs;
- Biologically active proteins and polypeptides;
- Biologically active carbohydrate derivatives;
- Antibiotics;
- Enzymes;
- Other natural substances (glucosides, nucleotides, nucleosides, and flavonoids);
- Immunobiological preparations [2, 3, 4].

The featured program ends in 1981, and will be taken over by the national research target program forming part of the central development program of pharmaceutical, pesticide, and intermediate-compound manufacture.

Additional Required Activities

A detailed plan for studies supporting the development of the pharmaceutical industry until 1985, and an outline program to cover the period until 1990 have been developed. These plans, starting out from the existing situation, do not stress the major increase in the research personnel but have as their goal the increase of the effectiveness of the research work. In addition to reducing the number of research themes and to the formation of nuclei, this also means that while the R/D personnel increases slightly, the effectiveness of the work will be increased by providing more research facilities for each researcher.

The research target program developed in 1980 for development in pharmaceutical, pesticide, and intermediate-compound manufacture is intended to fulfill the following needs:

- Increased orientation toward the target;
- Increased concentration of themes;
- Substantial increase in the percentage of original themes;
- Development of the research organization and management methods with the aim of ensuring increased effectiveness;
- Increased research expenditure;
- Above-average promotion of the biological research capacity;
- More effective financial incentives for research institutions and researchers;
- Increased participation of academic and university institutions;
- Further improvement of technical-scientific documentation and information activities;

- Better coordination of our own R/D activities and licence procurement;
- Broadening and intensification of international R/D cooperation.

The following themes have been included in the national medium-range R/D plan for the 1981 to 1985 period in the field of pharmaceutical research:

- Study of pharmaceuticals affecting the central nervous system;
- Study of pharmaceuticals affecting the heart and the circulatory system;
- Study of biologically active oligopeptides and polypeptides;
- Study of antibacterial, antifungal and antiviral agents.

Of course, major research themes in other areas are also underway. Among the product-development studies, mention should be made of anti-tumor agents, carbohydrate derivatives, enzymes, veterinary drugs, and yield-increasing agents. Developments aimed at providing a better biological background for research are also very important. They include biological screening studies, preclinical studies, pharmacodynamical studies, and pharmacokinetic studies. The Clinical Pharmacological Network is also scheduled for major modernization. Further development will take place in the field of analytical methods and structure determinations. Among the remaining tasks, special mention should be made of those which are aimed at the development of new drug forms and at the increase of the quality level of current manufacture.

In order to achieve an effectiveness up to the international level, for the introduction of 4-6 original Hungarian pharmaceuticals per year until 1990, it is necessary to ensure that we know more about the relationships between structure and effect, that we use a rationally plannable research methodology, that we make optimum use of the basic compounds assumed to be effective, and that we assure the most effective means for obtaining patent protection. Accordingly, we must get ready for making the following derivatives in the amounts stated:

- 10,000 compounds by 1985 and 15,000 compounds by 1990 each year;
- screening of the prepared compounds in a systematic manner at least in twice as many areas as we do today;
- more detailed effectiveness study of presumably 3-5 percent of the compounds on the basis of the preliminary screening;
- detailed pharmacological, toxicological, and teratological evaluation of 100-150 compounds per year, clinical-pharmacological evaluation of 20-30 compounds per year, and clinical evaluation of 7-10 pharmaceutical-candidates per year.

We have surveyed the state of the research activities in 1980 to find out the extent to which they support the products scheduled for introduction on the market in the 1981-1985 period. We found that in 1980 we have approximately 60 original compounds of which 20-25 percent could become products during the Sixth Five-Year Plan period. These 60 compounds can be classified as follows according to their effect categories:

Agents affecting the central nervous system - 20 compounds
Agents affecting the heart and the circulatory system - 17 compounds
Blood anticoagulants - 1 compound
Agents affecting the stomach and intestinal activity - 1 compound
Antipertussive agents - 3 compounds
Cytostatic agents - 5 compounds
Diuretic agents - 2 compounds
Antibacterial, antifungal, and antiviral agents - 6 compounds
Other preparations - 9 compounds.

These compounds are in a reasonably advanced state of biological study, and they do have a 20-25 percent chance of becoming products. It seems to us that in the 10-12 years ahead pharmaceutical research will develop as follows:

Designation	1980	1985	1990
Total staff	2800	3000	3200
Researchers included in the above	920	950	1000
Research expenditure in million forints	1385	2175	3680
Research expenditure in percent of the price income	6.5	7.0	7.5

The following are the main prerequisites for the accomplishment of the goals which we have set:

- Retention of the method used in 1980 for forming the technical development fund;
- Return of the central levy from the technical development fund to the pharmaceutical industry in the form of support;
- Training of 50-60 new diplomates each year for pharmaceutical research in the proper expertise distribution;

- Improved organization and management of research;
- Improved moral and material incentives for research achievements and their implementation in industry.

In the product-development sphere, we have provided for the implementation of technical and intellectual accomplishments originating from both our own efforts and from other socialist and non-socialist countries. Accordingly, we expect the following distribution in the price income (in percent):

Designation	1980	1985	1990
Our own original research	9	14	20
Our own reproductional research	73	57	40
CEMA cooperation	4	6	10
Licences and know-how from capitalist sources	14	23	30

On the basis of our background, which is more than one century old, and on the basis of our traditions and achievements so far we are confident that research and development in the pharmaceutical sector will continue to ensure those accomplishments which represent a solid foundation for the ongoing dynamic growth of our industry sector.

Manuscript received 13 December 1979.

2542
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NEW HUNGARIAN DATA STATUS DEVICE

Budapest SZAMITASTECHNIKA in Hungarian No 3, Mar 81 p 13

[Article by "Halev": "A New-Born Child Introduces Itself"]

[Text] I hereby inform you, dear colleague, that I have been born. Let me introduce myself. My full name is the synthetic data modeller (szintetikus adatmodellezo), but my parents have nicknamed me SZIAM, allegedly because I inherited my characteristics from my relative uncle and my network aunt. You know, they were always fighting, but their antogonistic characteristics fit together beatuifully and inseparably in me.

I came into the world in December 1980, after a pregnancy of about 14 months, in Budapest, in the applications Technology Main Department of SZAMOK [Computer Technology Training Center]. My father is a systems designer and my mother is a programmer. A dear midwife was also present at the birth; she is called the SZKCP [expansion unknown] target task. Unfortunately, I am not the fruit of professional love alone. Children require a lot of money and these days even children have a price.

Even before my birhh my parents decided that they would make a good data statement designer out of me. I do the usual childish tasks while they do the serious work. Of course, grown-ups do many things badly. You know, the systems designing uncles and programming aunts of today belong to an earlier generation, and there is no denying that they have a passion for old, bad customs. Their designs suffer from redundancy, inconsistnecy, inconnectivity and other strangely named diseases. My young heart (AMO, or data modeller [AdatMOdellezo]) is still strong and can resist such diseases.

The systems designing uncles and programming aunts in our large family often fall out. The men think in terms of conceptions but they are not precise while the much more precise women, better tied to realities, see the same design differently. In addition, they are always modifying the designs of the data statements behind each other's backs. That is how they get the above diseases. Well, you can't blame me for that sort of thing! It is true that my AMO heart would do anything for them, but I do not let my heart rule me. With my sharp Control Logic I immediately see if they want to use me badly. In such a case I give my opinion.

Although I am still small I can do some things myself already. If my parents give me interdependencies of property types which they call functional dependencies then I can design rather neat (third normal) individual types, and even linked types. I do the designing in the AMO mode. Of course, I will not swallow just anything; my system rejects pragmatic poisons, from the data modelling point of view.

Mommy and Daddy are very forgetful. They even forget what they had designed earlier. At such times I say: This is not what was involved in the past! I confess that I store the entire data vocabulary in my memory. If they ask my opinion I do not remain silent. With my SAS eyes (SZIAM data vocabulary [AdatSzotar]) I watch every change and search out every partial plan and design element. On request my SASLE query mouth [LEkerdezoke] belches out the information. I also undertake SASKA maintenance [KArbantartas], because I have two strong arms. You know, this is no miracle, because I am also blessed with SAMANistic abilities [a play on "shaman", a Ural-Altaic word used in English also].

Anyway, my name is deceptive. I can put together a data model not only from parts; I can also take apart badly put together designs and re-assemble them. In a word, I am a bit of an analyst. For example, I like to determine the basic data from the output contents. My special delight is to analyse the logical design of existing data statements.

I will not grow, but after much work I will certainly grow stronger. I hope that I will soon be much more (inter) active. My parents are doing everything in the interest of this.

My appetite is rather bad. Depending on the task I consume 120-180 K of central memory, because I do not eat in segments. But even with a relatively big task I do not use up 25 cylinders (IBM 2319) of plate memory. I eat quickly, I am finished with memory in a few seconds. Of course I like to munch on the plate.

I do not know what the future holds. But my Daddy said that if I am good I will have a little brother too, which he already calls "my dear" (PRECIOUS). But I am not jealous because he will be a precedence input/output analyser, and will build process models. The two of us will work well together and do great things. Until then, however, I am quite alone. So if my Daddy and Mommy let you, would you come and play with me a little?

I am including my picture. Aren't I pretty?

(Those interested can get additional technical details in the third issue of this year's INFORMACIO-ELEKTRONIKA, which will appear in May. The editors.)

8984
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SM 6905 FLOPPY DISK DATA PREPARING TERMINAL

Budapest SZAMITASTECHNIKA in Hungarian No 3, Mar 81 p 6

[Article by Peter Kacsuk and Bela Pohanka: "SM 6905--Floppy Disk Data Preparing Terminal"]

[Text] After a successful prototype test one of the newest products of the Computer Technology Factory of the Videoton Electronics Enterprise, the SM 6905 floppy disk data preparing terminal, also passed the MSZR [Mini-Computer System] test and approval held in November last year. Several dozen of these devices figure in this year's marketing plan of Videoton. What should users hnow about this product? Briefly, in a nutshell, they should know the following.

In developing the hardware the designers took into consideration in a far-reaching way the newest principles developed in the area of microprocessor systems and microcomputers and made use of the most recent achievements. Accordingly, the control of the terminal is based on a microprocessor and is designed to be universal. With the aid of the SM 6905 one can record on a floppy disk pata of any type desired, group it according to the desired aspects, forward the data prepared for processing to a central computer via a synchronous line (BSC algorithm) or put it directly on a floppy disk. Compilation, checking and correcting of format and data takes place on a monitor 16 lines by 40 characthrs. It should be noted here that one can write 80 characters to a line but of these only the last 40 appear. With this solution one can create characters based on a 7 by 8 point matrix which can be seen well even from a distance.

The terminal comes in one and two work position versions. It is made up of the following units: one VT 5300 universal terminal control, one MOMFLEX 3200 dual floppy disk, one or two VSD 47703 (or in the case of Latin characters VSD 47702) display, one VT 600/1200 modem, one memory expansion (up to 64 k bytes), and one VT 23 000 or DZM 180 printer (optional).

The software is of modular construction and provides the following operational modes: a FORMAT operational mode to define format; a RECORD operational mode in which data is loaded under control of the format data statements; a VERIFY operational mode in which the recorded data can be checked; an UP DATE operational mode in which the recorded data can be modified or corrected; and a MOVING operational mode to move recorded data between peripherals--for example, in this operational mode what is recorded on the floppy disk can be sent via a synchronous line to the central computer or it can be printed.

One should note the elegant and facile definability of the format dat tements. A format data statement consists of a chain of format records. The fo records are built up of various types of fields. The operator can devine the d tatements by records. The operator himself can build up the format records [illegible] ically on the screen with the aid of field identifier and filling characters. Th eld identifier characters unambiguously define the characters which can be struc the course of filling the field. If characters deviating from these are struc the machine warns the operator with a sound and picture error indicator.

There are three possibilities for record search within the data statement: by serial number, by content or by ordered content.

In the case of search by content the sample can be matched to any part of the record sought.

On the basis of the above services it can be seen that Videoton is offering a very efficient, swift and reliable data recording and data maintenance software for a very reliable and fast operating hardware.

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ES 7049--NEW, RELIABLE, HIGH-SPEED ALPHANUMERIC LINE PRINTER

Budapest SZAMITASTECHNIKA in Hungarian No 3, Mar 81 p 6

[Article by Istvan Barath: "ES 7049--The New, Reliable, High-Speed Alphanumeric Line Printer of the Uniform Computer Technology System"]

[Text] The manufacture of peripherals is coeval with the formation of the Videoton factory. Various categories of line printers make up a significant part of the Videoton peripherals. Ever more reliable models offering more services have been developed taking into consideration the experiences of manufacture and of users. The mechanical construction of the members of the line printer family is the same; the various category models can be changed by putting together a selection of electric cards. Thus far the line printers of Videoton have been sold in their own systems or supplied with various small interfaces (BSI, IRPR or according to user need). Several models have been approved in the MSZR [Mini-Computer System] also. In the interest of expanding market possibilities several line printer models, after selecting appropriate ones, were adapted to the ESZR [Uniform Computer Technology System] Standard Interface. After successful international testing in December 1980 the line printer received the code number ES 7049. The approved alphanumeric line printer is suitable for continuous operation on the MPX channel of computers furnished with the ESZR Standard Interface. Data transmission can take place in 4 bytes or in the burst mode. Either the channel or the operator can select the latter operational mode. The line printer itself includes all the electronic and mechanical elements which are necessary for communication with the MPX channel, for printing lines consisting of a maximum of 132 columns and for advancing driven paper in one or more copies. The buffer storage of the printer is suitable for storage of 132 characters.

The paper and the ink ribbon move between a hammer seat consisting of 132 elements and a continuously turning letter cylinder which carries the characters which can be printed. Printing takes place with a sensing of the content of storage synchronized with the turning letter cylinder and with a striking of the hammers at the appropriate moment. A single turn of the letter cylinder is needed to completely print out a line of 132 columns.

The number of operating organs is at a minimum in the interest of simplifying operation. The equipment has an internal tester which can be activated continuously in the off-line operational mode or upon change of signal. Supplemented with an indicating tester which figures as an operator's accessory it is possible to quickly isolate and eliminate errors; in the on-line operational mode it is possible to watch the channel signal processes with the aid of the indicator.

The gate containing the letter cylinder and the ink ribbon can be opened by truning it around a vertical axle so that the paper can be positioned directly on the toothed chain which moves the paper, in front of the line of hammers. In this way it is possible to avoid the clumsy paper feed-in which is frequently found in other models; by opening the gate the ink ribbon can be accessed easily also and quickly changed.

The life of the ink ribbon is increased by an active ink ribbon drive and by a foil contact solution used in place of the earlier "slat" micro-switch direction changer. In this way, with even wear, the life of the ink ribbon increases about 1.5 times. The hammer element is worthy of special mention; it moves completely without friction suspended on two leaf springs.

The ES 7049 line printer is manufactured in versions with a 96 character (Latin plus Cyrillic, Hungarian) and a 64 character (Latin) letter cylinder. Videoton has attempted to satisfy a just demand of Hungarian users with the appearance of the 96 character Hungarian (accented) character cylinder.

The VFU provides swift and precise tabling and IBM 1403 compatibility is ensured in its operation.

Technical Data

Dimensions: width 1,235 mm, depth 625 mm, height 1,170 mm, weight 320 kg.

The equipment works with single-phase (50 Hz plus or minus 1 Hz) current at 220 (plus 10 percent or minus 15 percent) volts. Network voltage changes within these limits can be continuous or sudden. The power taken from the network is a maximum of 2 kVA.

The operating temperature is frmm plus 10 to plus 43 degrees Celsius with a relative humidity of 30-90 percent.

The storage temperature is from minus 18 to plus 66 degrees Celsius with a relative humidity of 5-95 percent.

Dimensions of characters on character cylinder: maximum width 1.65 mm and maximum height 2.4 mm.

Length of printed line: a maximum of 132 characters.

Dividing distance between characters: 2.54 plus or minus 0.127 mm.

Distance between lines: 6 lines to the inch or 8 lines to the inch.

Printing speed: 1,200 lines per minute with 64 character letter cylinders; 750 lines per minute with 96 character letter cylinders.

Number of copies: one original and 1-5 copies.

Length of connecting cable: 6 meters.

Information code: DK01

The printer interface corresponds to the ESZR Standard Interface.

The power unit can be switched on locally or remotely.

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SPACE PROGRAM FOR PLASMA RESEARCH DESCRIBED

Warsaw SKRZYDLATA POLSKA in Polish No 14, 5 Apr 81 pp 8-9

[Article by Boguslaw J. Witkowski: "The SAVA Program--Polish Plasma Research in Space"]

Letter

Letter from the USSR Academy of Sciences to director of Aviation Institute

The USSR Academy of Sciences
Space Research Institute
No 115, Moscow, 6 February 1981

Director of Aviation Institute
Dr. A. Wierzba
Warsaw, Al. Krakowska 110

Esteemed Doctor!

Please accept our congratulations on the successful operation of the BUD-A very-low frequency spectrum analyzer, developed for the SAVA project, on the Prognoz-8 satellite which was launched 25 December 1980. This instrument is the first Polish instrument designed to investigate the outer layers of the magnetosphere, the head shockwave and the solar wind.

The initial scientific data obtained via the instrument is testimony of its excellent metrological parameters and reliability.

Please transmit to all participants in this experiment our congratulations and wishes for future successes.

Director R. Sagdeyev

Academy member

[Text] Not too long ago it was taught in schools that materials exist in three states: as solids, liquids or gases. For some time now, however, this viewpoint had to be supplemented with a fourth natural state--plasma, that is an ionized gas at an appropriately high temperature. Low-temperature plasma (10,000 to 30,000°C) has already been investigated by scientists and is being applied in technology, but so-called high-temperature plasma is very difficult to research because its temperature exceeds 1 million degrees. No material exists on earth that could be used to construct vessels to contain plasma at such temperatures.

However, scientists are seeking a solution for this problem because controlling such a plasma would be equal to realizing a controlled thermonuclear reaction for the synthesis of nuclei, which would solve the energy problem. In present experiments, a high-temperature plasma can be achieved for about 3 milliseconds if the plasma is enclosed in a so-called magnetic bottle. But research cannot be conducted in such a short time. However, if something cannot be done on earth, maybe it can be done in space. The realization of this idea took place literally a long way down the road--200,000 km distant. The problem was overcome thanks, among other things, to Polish scientists, engineers, technicians and workers.

Toward the end of 1980 the Prognoz-8 satellite, which has an elongated orbit (500-200,000 km), was launched from the Soviet Union with a Polish instrument aboard for analyzing plasma parameters. From the scientific side, this instrument, whose symbol is BUD-A, originated at the Aviation Institute under the direction of Doctor Aygmunt Krawczyk. Engineer Abigniew S'korski was the main designer.

The BUD-A Analyzer, or ILF, is an instrument designed to measure simultaneously changes in three space plasma parameters in the ultra-low frequency spectrum, namely changes in the electric field, magnetic field and ion stream. These measurements are made in conjunction with the Soviet BUD-E, BUD-M and BUD-P instruments which are sensors installed onboard the artificial earth satellite having a long apogee. During the experiment, information is obtained on changes in the spectrum power densities for the mentioned plasma parameters at 10 selected frequencies in the 2-10 Hertz frequency range. Measurements are taken in the solar wind (undisturbed), in the circum-earth shockwave, in the transient layers, in the magnetopause and in the inside layers of the magnetosphere.

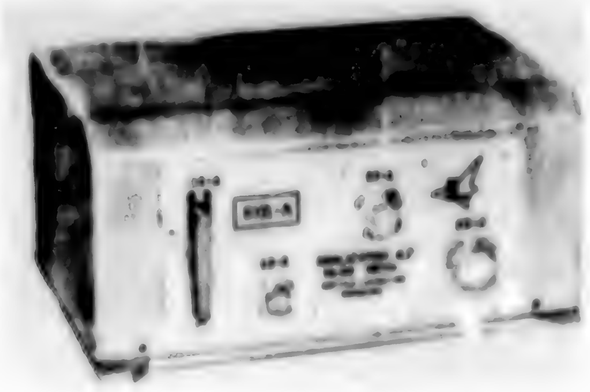

Figure 3. ILF Analyzer Constructed at the Aviation Institute

BASIC TECHNICAL SPECIFICATIONS

Number of measuring channels--3
Nominal heterodyne frequencies--2, 4, 8, 12, 18, 25, 45, 75 and 105 Hz
Power supply
Voltage--27 V
Current requirement--230 mA
Power usage--5.6 W
Dimensions--260 x 200 x 120 mm
Weight--2.5 kg

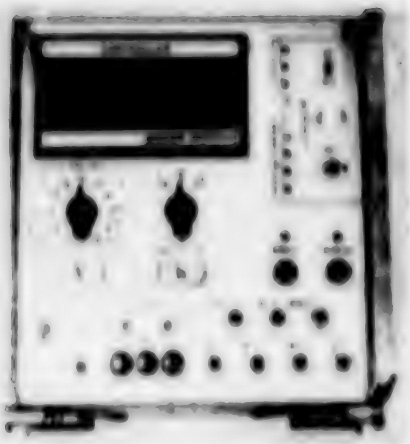

Figure 3. Control Instrument for Earth-Bound Measurements of the Analyzer

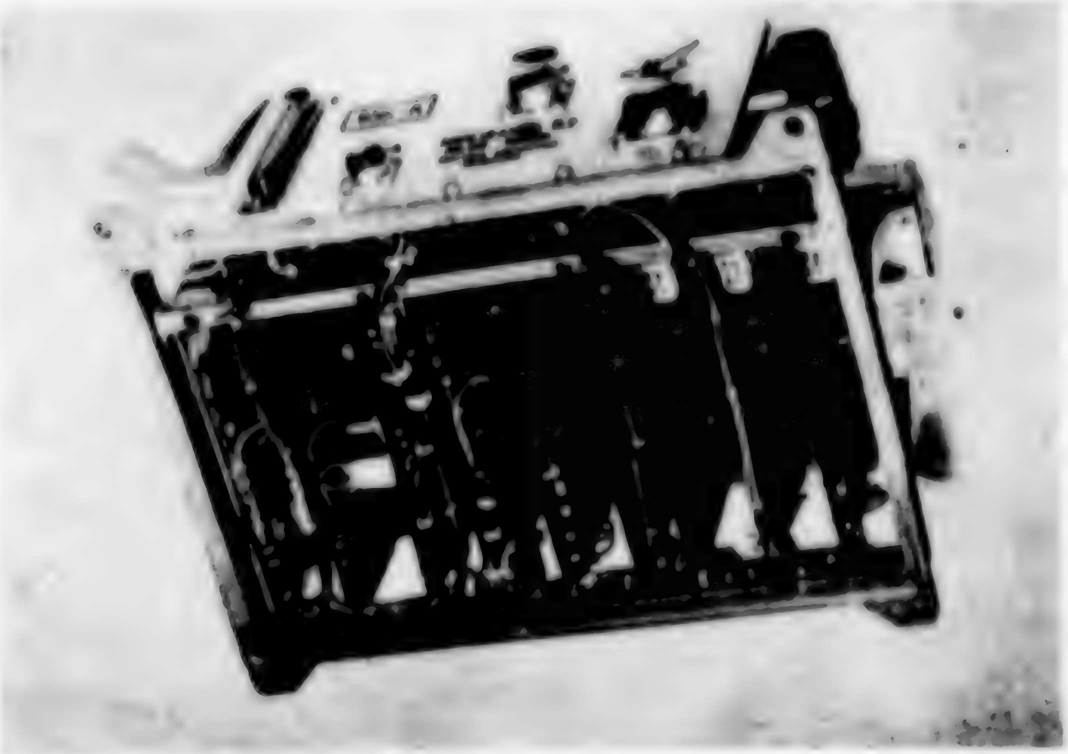

Figure 4. Internal View of Analyzer

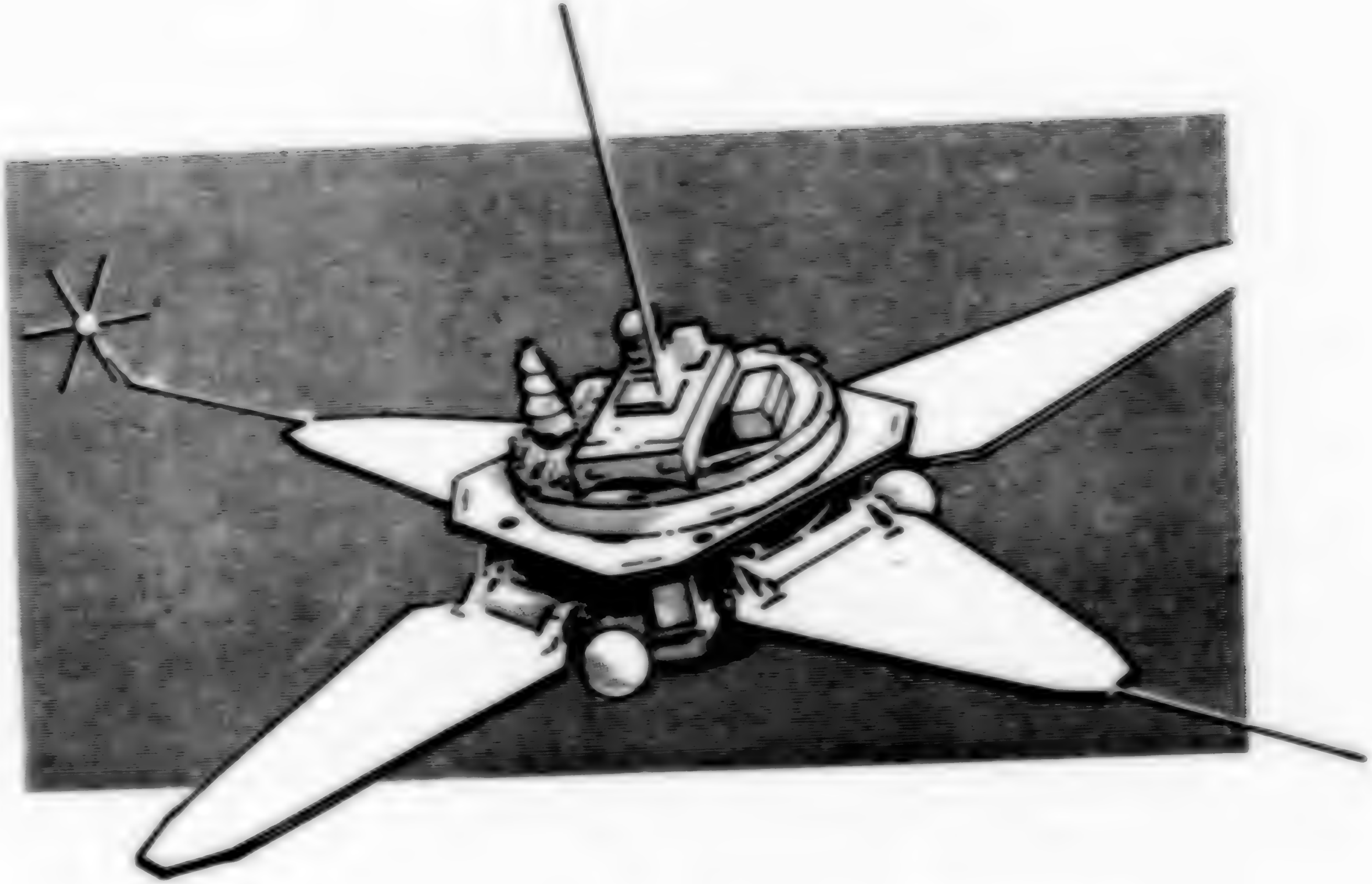

Figure 5. Diagram of Prognoz-8 satellite. The Polish ILF analyzer is located on the exposed block on the right side in the center part of the console. Four planes with solar elements and antenna components are shown.

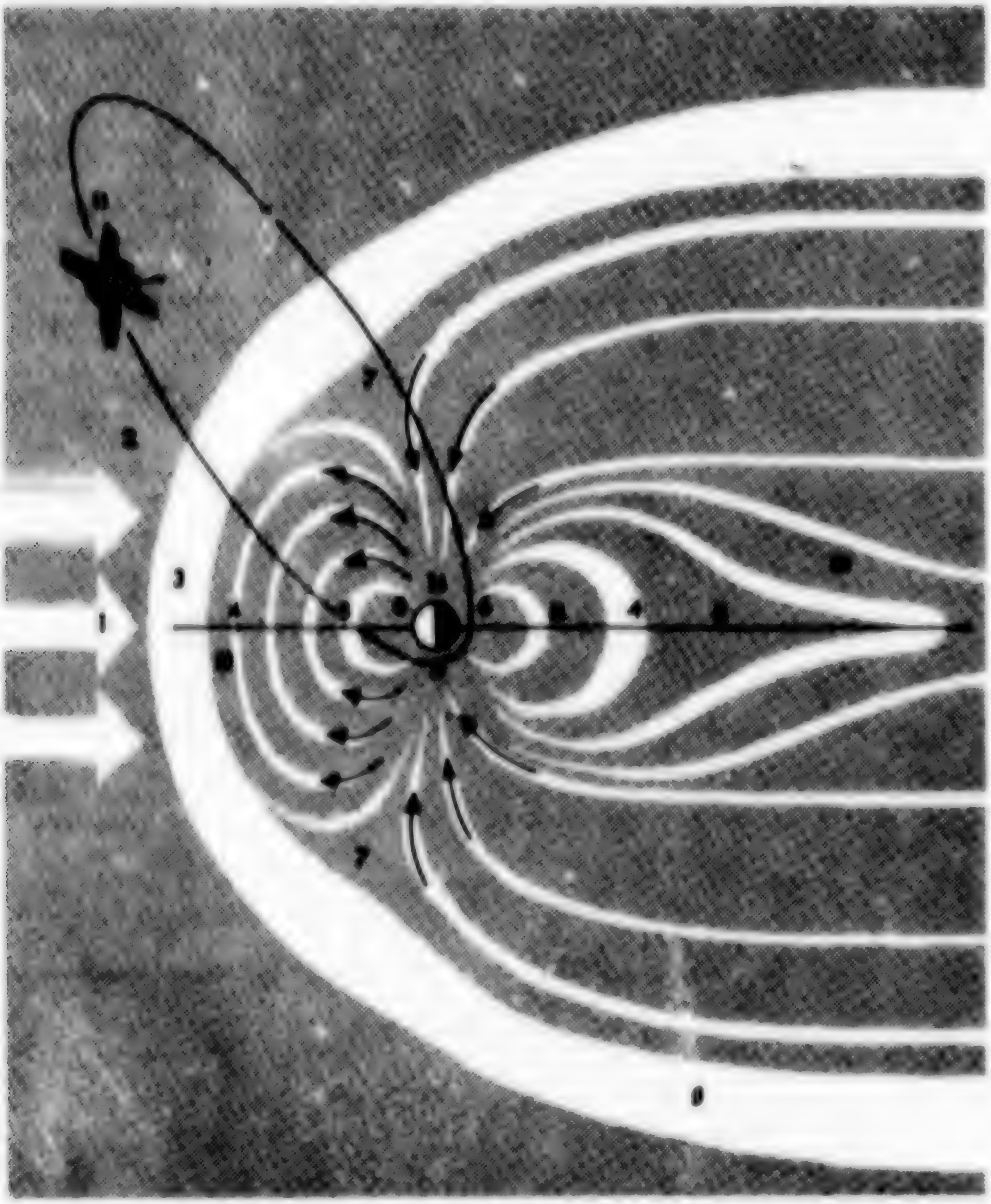

Figure 6. The Prognoz Orbit in the Magnetosphere

Key:
(1) Solar wind
(2) Head wave
(3) Transient layer
(4) Circular beam
(5) Outer radiation band
(6) Inner radiation band
(7) "Seal" in the magnetosphere
(8) Area of undisturbed radiation
(9) Magnetopause
(10) Plasma beam
(11) Prognoz-8 orbit

BUD-A (ILF) is an analog electric signal analyzer which analyzes and stores information for a long time period. During the short time period the satellite is close to earth it can transmit its stored information to ground communications stations.

As indicated in the letter shown in Figure 1, the USSR Academy of Sciences Space Research Institute values the Polish instrument very highly. It should be emphasized here that this is the first successful test in the world for investigating space plasma of long time duration. We are still waiting for the results of the investigations.

In addition to the analyzer itself, Polish engineers also developed a special instrument to test the ILF analyzer prior to launch. Both instruments use transistors and integrated circuits in their designs.

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LONG-RANGE POLAR RESEARCH PROGRAM OUTLINED

Warsaw KURIER POLSKI in Polish 10-12 Apr 81 p 4

[Article by Andrzej Markert: "Today and Tomorrow in Antarctica"]

[Text] Under the leadership of Prof Krzysztof Birkenmajer, the Fifth Polish Academy of Sciences [PAN] Antarctic Expedition reached King George Island in mid-January, completing the first stage of Poland's polar research effort. The main purpose of the expedition is to continue the geological research initiated by previous expeditions, including additional work in the area of geological cartography.

Under the leadership of Docent Stanislaw Rakusa-Suszczewski, the Maritime Fisheries Institute [MIR] and PAN expedition on the ship "Professor Siedlecki" also started out in January. This expedition is related to Poland's participation in the international biological research program BIOMASS (Biological Investigation of the Ecosystems of the Antarctic Ocean and of Antarctica's Resources). In February and March 1981, the first stage of this program, called FIBEX or First Biological Experiment, was initiated. These are experiments being conducted simultaneously by 17 ships in accordance with a uniform system. The "Professor Siedlecki" along with other ships from the USSR, Great Britain, the FRG, Chile, Argentina and Japan are now sojourning in the South Shetlands region, on the Scotia Sea and in the Drake Passage.

Comprehensive research during successive experiments in the biology and ecology of krill is projected in the BIOMASS program. Krill occupies a key position in the ecosystem of Antarctica's waters. It is the primary source of food for fish, cephalopods, seals, penguins and whales. The rational use of Antarctica's living resources, including programmed fishing, requires prior knowledge of krill resources.

Poland's Arctowski Polar Station plays an important role in this program. Because of its location, it enables coastal research to be conducted on a year-round basis. Admiralty Bay, on whose shores the station is located, is a marine test range for biological research. Hydrological and meteorological conditions that are typical for western Antarctica and biological groups that are characteristic of this region occur here.

The research conducted during the 1977-1980 period on Admiralty Bay provided much valuable material concerning the environment, some biological processes and aggregates of plant and animal organisms occuring in this region which will permit the rational use of these resources.

After completing the FIBEX experiment, the "Professor Siedlecki" will leave the PAN team at the Polish Polar Station on King George Island from which the team will return to Poland on another ship. Then the "Professor Siedlecki," under the direction of Dr Piotr Bykowski, will begin the second part of the Scotia Sea investigations. The MIR's research on fish and krill will precede this.

The PAN Committee on Polar Research also has prepared a new polar draft program for the 1981-1985 period in which many economizing measures are included. It will concentrate on strategic types of research that are of great scientific and economic significance. In the next several years the PAN will discontinue the large, expensive summer expeditions; instead the polar stations, whose crews will be changed annually, will conduct the basic scientific work. The present Fifth PAN Antarctica Expedition is the final one of this cycle. Poland cannot abandon the polar stations on King George Island in the Antarctic or on Spitsbergen in the Arctic for scientific and political reasons. After all, these stations are linked to the worldwide observation system for making meteorological and geophysical observations. The stations operate on a year-round basis and provide the most advantageous conditions for conducting polar research.

The new polar program encompasses the three most important areas of research: biology, earth sciences and oceanology. In the next several years, the main emphasis will be placed on exploring ocean areas in association with the extensive international programs. As we stated, Poland is participating in the international biological program BIOMASS, which is just beginning and in which the joint MIR and PAN expedition on the "Professor Siedlecki" are participating. However, the next Polish biological expedition will take part in the so-called Second Biological Experiment SIBEX during the 1983-1984 season.

Two geophysical ocean expeditions on the hydrographic ship "Kopernik" will also take place, one to the Greenland Sea during the summer of 1981 and the other to the western waters of the Antarctic during the 1982-1983 season. The latter expedition will be a continuation of work that was started by the PAN Ocean Geophysical Expedition in 1979-1980 during which a number of seismic investigations of the Antarctic shelf and ocean depths were conducted. The Polish investigations produced interesting results and were highly acclaimed by the Scientific Committee for Antarctic Research [SCAR].

At the October 1980 meeting in New Zealand, the Polish delegation proposed that geophysical work conducted in association with the research on the earth's interior be coordinated internationally. As a result, Poland was asked to organize a meeting for the fall of 1981 of the SCAR working group for coordinating the expanded geophysical research in the Antarctic region.

In turn, during the 1984/1985 season an oceanographic expedition will start out. It will be concerned with investigating the conditions promoting the expansion of life in the ocean, including the contents and chemical composition of sea water, oxygen content, and the influx of solar energy.

Ocean expeditions are most beneficial for scientific reasons; they also provide much basic data that provide a valuable basis for the practical uses of the natural resources of the polar regions.

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